

TAXONOMIC STUDIES ON THE GENUS *HOYA* R. BR. (ASCLEPIADACEAE) IN PAPUASIA, 1-5

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Summary

1. The group of species of *Hoya*, known colloquially as 'New Guinea Whites', is revised. This group includes *H. albiflora* (Zipp. ex Blume) Boerl., *H. magnifica* P. Forster & Liddle sp. nov., *H. naumanii* Schltr., *H. australis* subsp. *tenuipes* (K. Hill) P. Forster & Liddle and *H. calycina* Schltr. Two subspecies are recognised for *H. calycina* with subsp. *glabrifolia* P. Forster & Liddle newly described. 2. *H. pottsii* Traill is lectotypified and *H. nicholsoniae* F.Muell., *H. hellwigiana* Warb. and *H. sogerensis* S. Moore are placed in synonymy. 3. *H. anulata* Schltr. is found to be the earliest name for the taxon described as *H. schlechteriana* S. Moore, *H. poolei* C.White & Francis, *H. pseudolittoralis* C. Norman or *H. alata* K. Hill. 4. *H. revoluta* Wight ex J.D. Hook. is found to be the earliest name for the taxon described as *H. littoralis* Schltr., *H. inconspicua* Hemsley or *H. dodecatheiflora* Fosb. 5. *H. sussuela* (Roxb.) Merr. is the earliest name for a widespread taxon to which the name *H. lauterbachii* Schumann has been previously misapplied. *H. holtrungii* Warb. and *H. coronaria* var. *papuana* Bailey are placed in synonymy of *H. sussuela*.

Introduction

Approximately eighty published names have been applied to species of *Hoya* R. Br. in Papuaia (Irian Jaya, Papua New Guinea, Solomon Islands). An account of the genus in German New Guinea (now part of Papua New Guinea) was provided by Schlechter (1913) who utilised mainly his own field collections. There is no overall account of the genus in Papuaia and many species have been subsequently described without reference to previously described taxa (e.g. Moore 1916).

Despite this early taxonomic activity, there is considerable confusion as to the identity of the taxa present in the region. A large number of unidentified collections have accumulated in herbaria, mainly as a result of the collecting activities of officers of the Department of Forests, Lae (NGF and LAE series) and the Archbold expeditions. The primary set of the NGF-LAE collections is at the National Herbarium of Papua New Guinea (LAE), with the second set at the Rijksherbarium, Leiden (L), the third set at the Queensland Herbarium (BRI), and minor sets at other herbaria such as the Australian National Herbarium (CANB). The collections of L.J. Brass (Archbold expeditions) are distributed in several herbaria with primary sets mainly at the Arnold Arboretum, Harvard (A), New York Botanic Gardens (NY) and L, with minor sets of some numbers at BM and BRI.

While there are many collections of *Hoya* available, few have been identified fully. This is undoubtedly a result of the lack of a comprehensive revision and key to the species. Also, it has been assumed that the types for many of the species described by Schlechter were destroyed in the firebombing of the Berlin Herbarium (B) in 1942. However, this is not the case and most are still extant in B (B. Leuenberger, pers. comm. 1988). Unfortunately, the same cannot be said for the species named by Engler, Schumann or Warburg. Very few duplicates of type collections relevant to taxa named by these workers have been located. Although the large number of published names does not give an accurate picture of the actual number of species of *Hoya* present in Papuaia, the region, nevertheless, does have a rich diversity of taxa comprising approximately 70 species.

From examination of Papuaian holdings at the herbaria A, BO, BM, BISH, BRI, CANB, L, LAE, MEL, NY and SING, and relevant type material at K, P and WRSL, it is evident that some of the taxa collected and named by Schlechter, often from single collections, have not been recollected in more recent times. Conversely there are

collections, particularly from Irian Jaya and southern Papua New Guinea that represent undescribed taxa not seen by him.

A comprehensive revision of the genus in this region will require extensive field work and cultivation of field-collected material which will take many years. In the interim we believe we have been able to match a significant proportion of existing herbarium collections with the types from various taxa. These identifications have represented significant changes to known distribution records of the taxa concerned in the Papuan region and beyond. We believe it to be of some importance to progressively publish these findings, if only to stimulate curation in other herbaria, and to encourage further fieldwork and study. In the long-term we hope to produce a revision of the genus in the region.

At this preliminary stage of our investigations, some comment on nomenclatural priority is necessary. We have previously stated (Forster & Liddle 1990) that for certain widespread taxa, it is possible that earlier legitimate names exist than the ones we previously accepted. Such has proved to be the case with *H. revoluta* Wight ex J.D. Hook., *H. anulata* Schltr., *H. sussuela* (Roxb.) Merr. and *H. pottsii* Traill. which have been found to be earlier names for species previously known by more familiar names.

Notes on Terminology

Indumentum cover is described using the terminology of Hewson (1988), except that 'scattered' is used instead of 'isolated'. In previous papers we have described the glandular structures at the base of the leaf lamina as 'extrafloral nectaries' and those at the sepal sinus bases as 'glands'. However, following the excellent review of the morphology and evolution of the corona and related structures in Asclepiadaceae and allied families by Kunze (1990), we are now calling both these structures 'colleters'.

1. Revision of the 'New Guinea Whites'

In *Hoya* horticulture, there is a group of taxa originating from Papuasias that have been known colloquially as the 'New Guinea Whites'. These taxa have large, showy, usually totally white flowers. Naming of cultivated material of these plants has been hopelessly confused and generally based on ill-informed conjecture of horticulturalists attempting to match original descriptions to live plants without recourse to the types. Much of this confusion has centred on the definition of *H. australis* R. Br. ex Traill, (see Forster & Liddle 1991), *Hoya albiflora* (Zipp. ex Blume) Boerl. and *H. calycina* Schltr. (e.g. Burton 1989). The existence of two undescribed taxa in the group has also added to the confusion.

The present study is based both on live and herbarium specimens.

Key to taxa of 'New Guinea Whites' *Hoya*

- | | |
|---|---------------------|
| 1. Flower campanulate; corolla not red under coronal lobes; corolla lobes triangular | 2 |
| Flower campanulate-rotate; corolla red under coronal lobes; corolla lobes lanceolate-ovate | 3 |
| 2. Corolla 40–45 mm diameter; lobes horizontal or reflexed, 15–18 mm long | H. magnifica |
| Corolla 20–25 mm diameter; lobes inflexed, 7–11 mm long | H. albiflora |
| 3. Staminal column elongated with staminal corona raised well above corolla | H. naumanii |
| Staminal column not elongated, base of staminal corona situated more or less flush with corolla | 4 |

4. Corolla internally with dense puberulous indumentum of short white hairs; staminal corona lobes 1.2-3.5 mm long **H. australis**
 Corolla internally glabrous or with only scattered puberulous indumentum of short white hairs; staminal corona lobes 3.4-4.8 mm long **H. calycina**

Note: *H. naumanii* Schltr. is restricted to Bougainville and Solomon Islands and will be dealt with in detail in a later publication when recently collected material (June 1991) has been grown on and flowered. *H. australis* subsp. *tenuipes* (K. Hill) P. Forster & Liddle, the only subspecies of *H. australis* present in Papuaasia, has been covered previously (Forster & Liddle 1991).

1. ***Hoya magnifica*** P. Forster & Liddle, **sp. nov.** a *H. albiflora* (Zipp. ex Blume) Boerl. corolla 40-45 mm diametro eius lobis 15-18 mm longis reflexis vel horizontaliter portatis differt. **Typus:** Papua New Guinea. MOROBE PROVINCE: Palenkwa, Golden Pines, 7°06'S, 146°35'E, 24 April 1969, *H. Streimann* & *A. Kairo* NGF39381 (holo: CANB!; iso: A!, BO!, BRI!, L!, LAE!; K n.v.)

Liane to several metres long, latex white. Stems cylindrical, with dense indumentum when young, becoming sparse with age; internodes up to 270 mm long and 5 mm diameter. Leaves petiolate, held erect or at angle of 10-20° from vertical; lamina elliptic-ovate to narrow-ovate, up to 190 mm long and 100 mm wide; upper surface with sparse indumentum, venation obscure; lower surface with dense indumentum, venation obscure; tip acute, shortly acuminate to somewhat apiculate; base cordate to rounded; petiole 14-43 mm long, 2.3-2.5 mm diameter, with dense indumentum; colleters 4 at lamina base. Cymes racemiform, up to 90 mm long, held horizontally to pendulous; peduncles 9-10 mm long, 5-6 mm diameter, with dense indumentum; bracts triangular, 1.4-1.5 mm long, 1.2-1.3 mm wide, with sparse to dense indumentum. Flowers 10-15 mm long, 40-45 mm diameter; pedicels 20-50 mm long, 1.1-2.6 mm diameter, with dense indumentum. Sepals lanceolate-ovate, 13-16 mm long, 7-10 mm wide, with dense indumentum externally; colleters 5 large and 5 small (minute) at base of each sinus, each large colleter subulate, 2-3 mm long, 0.7-0.8 mm diameter, with dense indumentum. Corolla campanulate, cream to white; tube 10-14 mm long, 22-25 mm diameter, glabrous; lobes triangular, held horizontally or reflexed, 15-18 mm long, 15-18 mm wide, glabrous. Staminal corona cream to white, 4-5 mm long, 10-16 mm diameter; each lobe 4.8-7.0 mm long, 4.0-4.5 mm high, 2.8-4.0 mm wide at base and c. 0.5 mm wide at upper tip, outer edge rounded and upturned, inner tip lanceolate, not extending beyond style-head. Staminal column 4-7 mm long, 4.6-5.0 mm diameter; anther appendages lanceolate, 1.7-2.0 mm long, 1.3-1.7 mm wide; alar fissure 2.0-2.5 mm long. Style-head depressed-globose, 6.5-7.0 mm long, 4.5-5.0 mm diameter. Ovaries c. 4 mm long and 2 mm diameter, with sparse indumentum. Pollinarium 1.3-1.4 mm long, 1.2-1.3 mm wide; pollinia oblong, 1.12-1.15 mm long, 0.35-0.42 mm wide, with pellucid germination mouth on outer edge; corpusculum ovate, 0.8-0.9 mm long, 0.55-0.58 mm wide; caudicles 0.30-0.35 mm long, 0.13-0.14 mm wide, not winged. Fruit fusiform, c. 190 mm long and 12 mm diameter, glabrous. Seed not seen. **Fig. 1.**

Specimens examined. Papua New Guinea, MOROBE PROVINCE: Moikisung - Manga track, c. 2 km above Moikisung, Huon Peninsula, 6°37'S, 147°38'E, Sep 1976, *Clunie et al.* LAE63319 (BRI,L,LAE); Mapos, Snake River, 6°55'S, 146°45'E, Mar 1971, *Streimann & Kairo* NGF25879 (BRI,CANB,L,LAE); Bulolo - Watut Divide, Rd 46, 9 km SW of Bulolo, 7°15'S, 146°35'E, Dec 1980, *Kairo* 691 (A,L; K n.v.); Wantoat, Feb 1940, *Clemens* 11126 (A,BISH,BRI,L); Patep, Mumeng, Mar 1979, *Rau* 482 (LAE). **Cultivated.** Lae Botanic Gardens (origin not stated), 1957, *Millar* NGF9213 (A,BRI); Arawa Plantation, Bougainville (origin not stated), Apr 1970, *Millar & Vandenberg* NGF48503 (BRI,LAE); Emerald Creek, Mareeba (ex Lukins Rubber Estate near Sogeri, Central Province, USDA354244), Apr 1990, *Liddle* IML76 (BRI).

Distribution and habitat: Known with certainty only from the Morobe and Central Districts of Papua New Guinea (**Map 1**). Plants grow as lianes in lowland rainforests at altitudes of 650 - 2000 m.

Notes: This species has been confused with *H. albiflora* (Zipp. ex Blume) Boerl. in cultivation. It is probably closely related to *H. albiflora* but is immediately distinguishable by the much larger flowers of which the corolla lobes are held horizontally or reflexed at anthesis, as opposed to the smaller flowers with corolla lobes inflexed at anthesis in the latter species.

Etymology: The specific epithet alludes to the magnificent white flowers of this species.

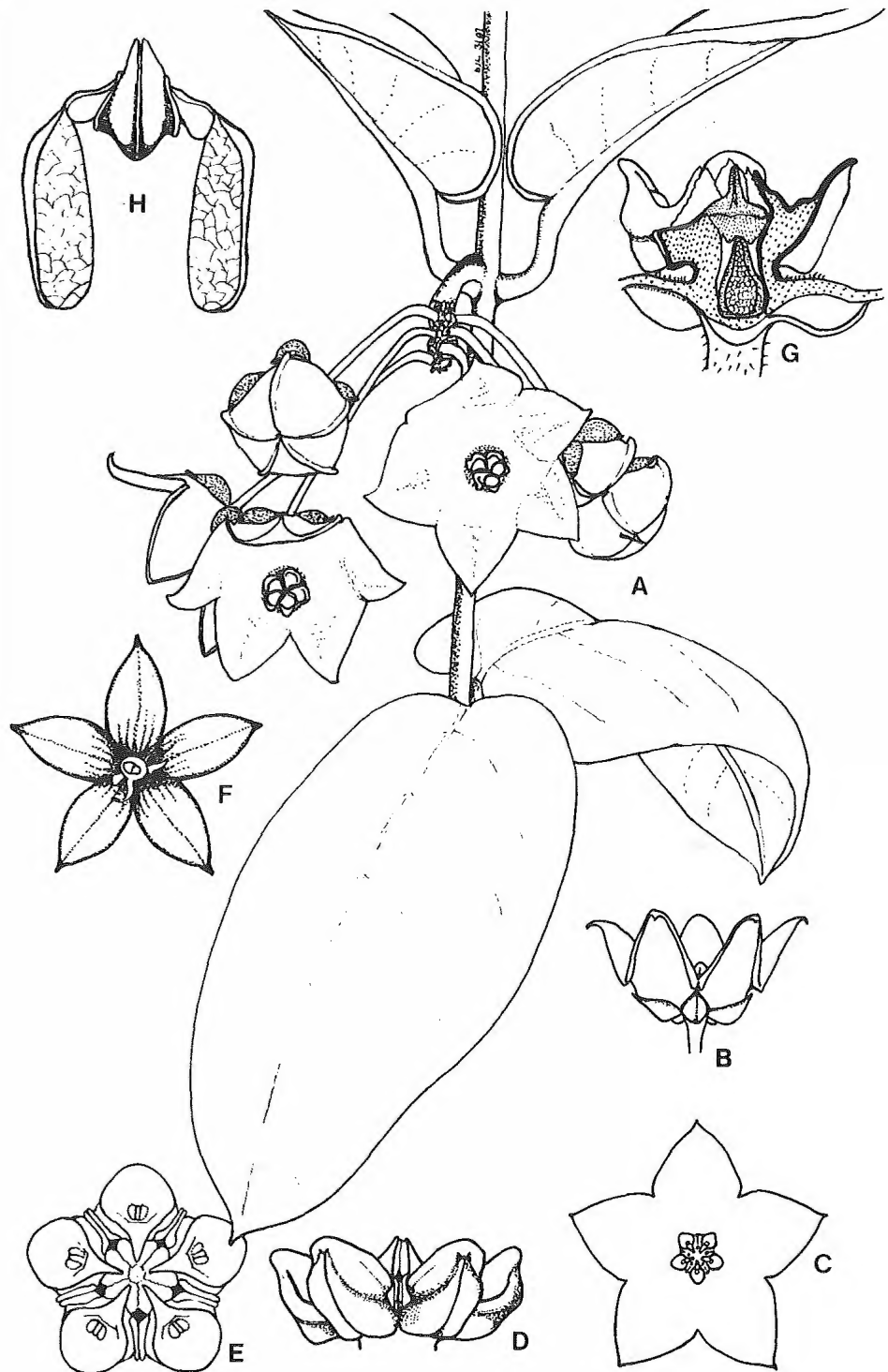


Fig. 1. *Hoya magnifica*: A. habit of flowering stem $\times 0.5$. B. side view of flower $\times 0.5$. C. face view of flower $\times 0.5$. D. side view of staminal column and corona $\times 2.5$. E. face view of staminal column and corona $\times 2.5$. F. face view of calyx $\times 2.5$. G. vertical cross-section of flower $\times 2.5$. H. pollinarium (inverted) $\times 16$. All from Liddle IML76. Del. D.J. Liddle.

2. *Hoya albiflora* (Zipp. ex Blume) Boerl., Handl. Fl. Ned.-Ind. 2(2): 440 (1899); *Pterostelma albiflora* Zipp. ex Blume, Rumphia 4: 33, t. 188 (1849). **Type:** Nov. Guinea [New Guinea], Zipp. [Zippelius] (holo: L! [898168-96, 898168-95, 898168-94]).

Blume, Fl. Ned. Bat. 1: 513 (1856).

Liane to several metres long, latex white. Stems cylindrical, up to 6 mm diameter, with sparse indumentum when young, becoming sparse to glabrous with age; internodes up to 180 mm long. Leaves petiolate; lamina elliptic, up to 180 mm long and 90 mm wide; upper surface glabrous, venation obscure; lower surface glabrous, secondary venation of 6-7 veins per side of midrib nearly obscure, tertiary venation obscure; tip acute to shortly acuminate; base cuneate, truncate or cordate; petiole 18-30 mm long, 1.4-3.0 mm wide, glabrous or with scattered indumentum; colleters 4 at lamina base. Cymes racemiform, up to 70 mm long, held pendulously; peduncles 4-6 mm long, 2-3 mm diameter, with scattered to dense indumentum; bracts triangular to lanceolate-ovate, 0.8-1.6 mm long, 0.6-1.0 mm wide, with scattered to dense indumentum. Flowers 15-18 mm long, 20-25 mm diameter; pedicels 25-50 mm long, 1.0-1.6 mm diameter, with scattered to dense indumentum. Sepals lanceolate-ovate, 13-15 mm long, 6-7 mm wide, with sparse to dense indumentum externally; colleters 5 at base of each sinus, each gland subulate, 3-7 mm long, c. 1 mm diameter, with sparse indumentum. Corolla campanulate, cream to white; tube 8-10 mm long, 15-17 mm diameter, glabrous; lobes triangular, inflexed, 7-11 mm long, 5.5-12.0 mm wide, glabrous. Staminal corona cream to white, 4-5 mm long, 7-8 mm diameter; lobes 3-4 mm long, 4.5-5.0 mm high, 2.7-2.8 mm wide at outer edge, c. 0.5 mm at inner tip, outer edge upturned and sharply rounded, inner tip subulate and reflexed from style-head. Staminal column c. 4 mm long, 5.0-5.4 mm diameter; anther appendages lanceolate, obscuring style-head, 1.5-1.8 mm long, 0.9-1.4 mm wide; alar fissure 1.5-2.5 mm long. Style-head depressed-globose, 1.8-2.0 mm diameter. Ovaries 2.6-3.0 mm long, 1.9-2.0 mm diameter, glabrous. Pollinarium 1.15-1.20 mm long, 1.0-1.1 mm wide; pollinia oblong, 1.15-1.20 mm long, 0.44-0.45 mm wide, with pellucid germination mouth on outer edge; corpusculum ovate, 0.80-0.85 mm long, 0.32-0.50 mm wide; caudicles unwinged, 0.35-0.37 mm long, 0.12-0.13 mm wide. Fruits and seeds not seen. **Fig. 2.**

Specimens examined. Papua New Guinea. MOROBE PROVINCE: Patep III, 6°20'S, 146°45'E, Aug 1969, Millar NGF40977 (BRI, LAE; K n.v.). **Cultivated.** Emerald Creek, Mareeba (from unknown origin), Apr 1990, Liddle IML299 (BRI).

Distribution and habitat: *H. albiflora* is known only from the Morobe Province in Papua New Guinea (**Map 2**) where it grows as a liane in rainforest.

Notes: There are few collections of *H. albiflora*, either in herbaria or in cultivation. While there are several differently numbered clones of *H. albiflora* in cultivation, none have collection data, and all are probably from the same original plant.

3. *Hoya calycina* Schltr., Bot. Jahrb. Syst. 50: 125 (1913). **Type:** Papua New Guinea. MADANG PROVINCE: Kani Geb., Mar 1908, R. Schlechter 17510 (holo: B (photo at BRI)).

[*Hoya albiflora* auct., non (Zipp. ex Blume) Boerl.: Burton, Hoyan 11(2): 57-58 (1989)].

Liane to several metres long, latex white. Stems cylindrical, up to 6 mm diameter, glabrous or with scattered to dense indumentum when young, becoming corky with age; internodes up to 160 mm long. Leaves petiolate; lamina elliptic to elliptic-ovate, up to 170 mm long and 90 mm wide; upper surface glabrous or with scattered indumentum, venation obscure; lower surface glabrous or with scattered to dense velutinous indumentum, venation obscure; tip acute, acuminate, or apiculate; base rounded, cuneate, or slightly cordate; petiole 12-30 mm long, 1.5-3.5 mm diameter, with scattered to dense indumentum; colleters 4 at lamina base. Cymes racemiform, up to 70 mm long; peduncles 6-25 mm long, 3-7 mm diameter, glabrous or with scattered to dense indumentum; bracts triangular to lanceolate, 0.8-1.0 mm long, 0.5-1.0 mm wide. Flowers 9-10 mm long, 18-28 mm diameter; pedicels 24-44 mm long, 1.6-2.0 mm diameter, glabrous or with scattered to dense indumentum. Sepals lanceolate to lanceolate-ovate, 2.8-5.0 mm

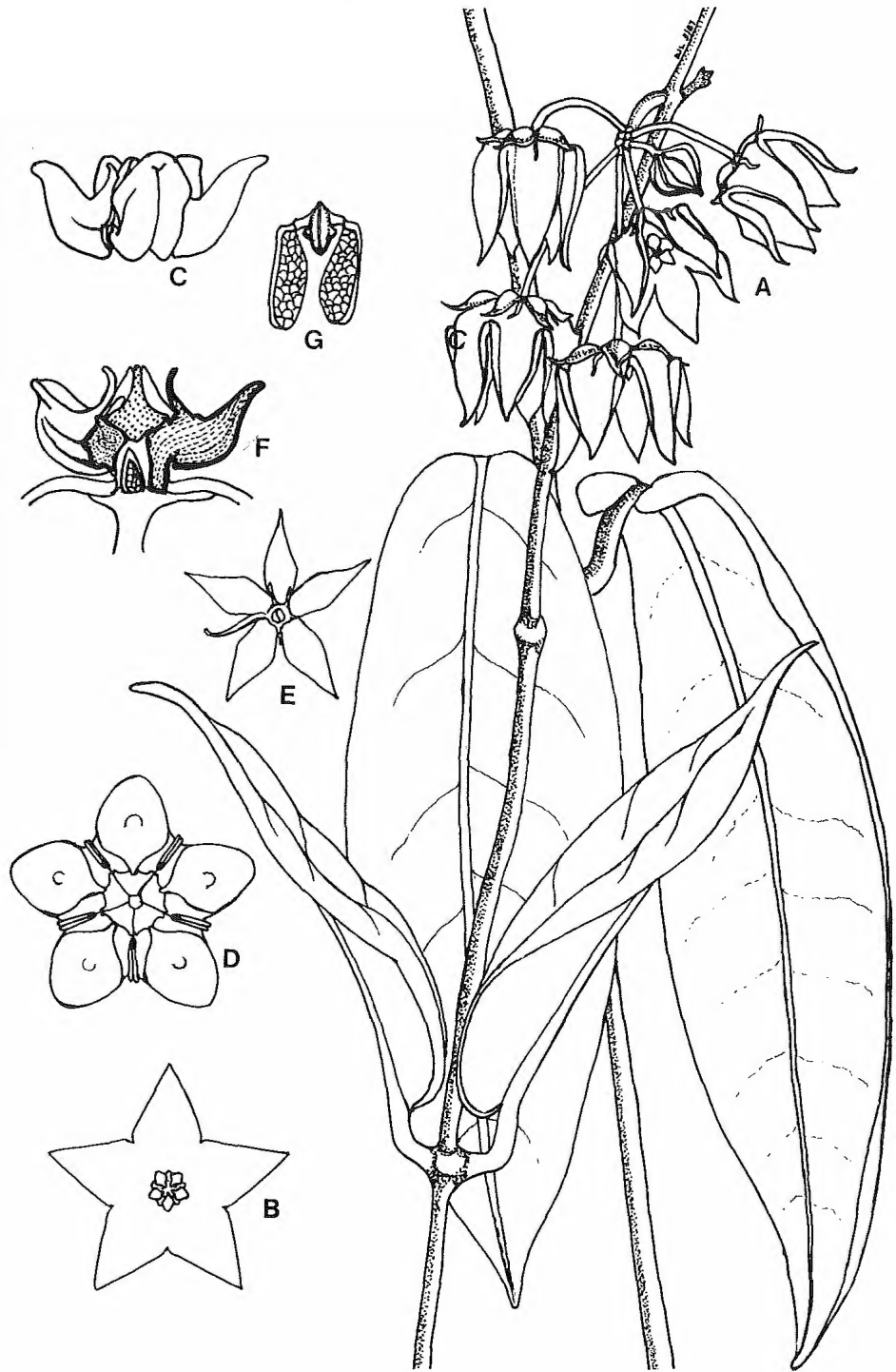


Fig. 2. *Hoya albiflora*: A. habit of flowering stem $\times 0.5$. B. face view of flower $\times 0.5$. C. side view of staminal column and corona $\times 3$. D. face view of staminal column and corona $\times 3$. E. face view of calyx $\times 0.75$. F. vertical cross-section of flower $\times 3$. G. pollinarium (inverted) $\times 8$. All from Liddle IML299. Del. D.J. Liddle.

long, 1.2–3.0 mm wide, glabrous or with scattered to dense indumentum; base of each sinus with an irregular glandular ridge. Corolla campanulate-rotate, cream to white, red to purple under coronal lobes and around gynostegium; tube 3.0–5.4 mm long, 8–14 mm diameter, glabrous; lobes lanceolate-ovate, 7–13 mm long, 4–9 mm wide, glabrous or with scattered to sparse indumentum on the edges and externally. Staminal corona 4.0–4.3 mm long, 7–13 mm diameter; lobes 3.4–4.8 mm long, 4.0–4.3 mm high, 1.8–2.5 mm wide. Staminal column 3.6–4.0 mm long, 2.5–3.5 mm diameter; anther appendages lanceolate, 1.6–2.0 mm long, 1.7–1.8 mm wide; alar fissure 1.3–2.0 mm long. Style-head depressed-globose, 1.5–1.9 mm diameter. Ovaries 2.3–2.4 mm long, 1.8–1.9 mm wide, glabrous. Pollinarium c. 1.1 mm long, 0.85–0.90 mm wide; pollinia oblong, 1.05–1.10 mm long, 0.35–0.40 mm wide, with pellucid germination mouth on outer edge; corpusculum ovate, 0.60–0.65 mm long, 0.35–0.40 mm wide; caudicles unwinged, 0.25–0.30 mm long, 0.06–0.07 mm wide. Fruit and seed not seen. **Fig. 3.**

Notes: *H. calycina* is a distinctive species that has been confused with *H. australis* and *H. albiflora*, mainly because of its superficially similar flowers. It differs most markedly from *H. australis* in the more-or-less internally glabrous corolla and the much larger staminal corona and from *H. albiflora* in the rotate corolla. Like *H. australis*, *H. calycina* is variable in terms of indumentum and two subspecies can be recognised on this character.

Key to subspecies of *Hoya calycina*

1. Lamina with dense velutinous indumentum below, calyx and corolla with sparse to dense indumentum externally subsp. **calycina**
 Lamina glabrous or with scattered indumentum below, calyx and corolla glabrous or with scattered indumentum externally subsp. **glabrifolia**

3a. *Hoya calycina* subsp. **calycina**

Lamina with dense velutinous indumentum below. Calyx and corolla with sparse to dense indumentum externally.

Specimens examined. Papua New Guinea. NEW IRELAND: Wanup near Lossuk, 2°45'S, 151°04'E, Jan 1967, *Coode et al.* NGF29625 (L). MOROBE PROVINCE: S of Boana, 6°30'S, 146°50'E, Feb 1977, *Conn et al.* 86 (K,L); Patep Creek, 6°35'S, 146°25'E, May 1959, *Millar* NGF9967 (A,BRI,CANB,LAE); Zenag, 7°00'S, 146°35'E, Jul 1968, *Millar* NGF12115 (A,BRI,CANB,L,LAE); Kwaimengu, Aseki Patrol Area, Apr 1966, *Craven & Schoadde* 1459 (A,L,LAE). SOUTHERN HIGHLANDS PROVINCE: Mt Bosavi, northern side, N of the Mission Station, 6°26'S, 142°50'E, Oct 1973, *Jacobs* 9496 (L,LAE). NORTHERN PROVINCE: c. 2 km W of Popondetta along road near airstrip, Jul 1953, *Hoogland* 3379 (A,BM,BRI,CANB,K,L,LAE). MILNE BAY PROVINCE: SW of Nowata airstrip, 9°59'S, 149°44'E, Jul 1969, *Kanis* 1104 (CANB,LAE). **Cultivated.** Emerald Creek, Mareeba (ex plant collected MOROBE PROVINCE: Patep II Village, [USDA354236]), Apr 1990, *Liddle* IML201 (BRI).

Distribution and habitat: Widespread in Papua New Guinea (**Map 3**). Plants grow in rainforest at altitudes of 20–1400 m.

- 3b. *Hoya calycina* subsp. **glabrifolia** P. Forster & Liddle **subsp. nov.**, a *H. calycina* Schltr. subsp. *calycina* lamina foliorum glabra vel infra pilis dispersis praedita, calyce corollaque glabra vel extus pilis non nisi sejunctis praedita differt. **Typus:** Irian Jaya. 4 km SW of Bernhard Camp, Idenburg River, Mar 1939, *L.J. Brass* 13465 (holo: BRI!; iso: A!, BO!, L!).

Lamina glabrous or with scattered indumentum below; calyx and corolla glabrous or with scattered indumentum externally.

Specimens examined. Papua New Guinea. WESTERN HIGHLANDS PROVINCE: Jimmi Valley, near Karap, Jun 1955, *Womersley & Millar* NGF7648 (BRI,LAE). EASTERN HIGHLANDS PROVINCE: Kassam, Nov 1959, *Brass* 32470 (LAE). MOROBE PROVINCE: Bupu Village, Wampit, 6°50'S, 146°55'E, Jul 1967, *Millar* NGF22936 (BRI,L,LAE). CENTRAL PROVINCE: Isuarava, 9°00'S, 147°44'E, Mar 1936, *Carr* 16107 (BM,CANB,L,NY,SING; K n.v.).

Distribution and habitat: Widespread but rarely collected in Papua New Guinea (**Map 4**). Plants grow as lianes in rainforest at altitudes of 1500–1900 m.

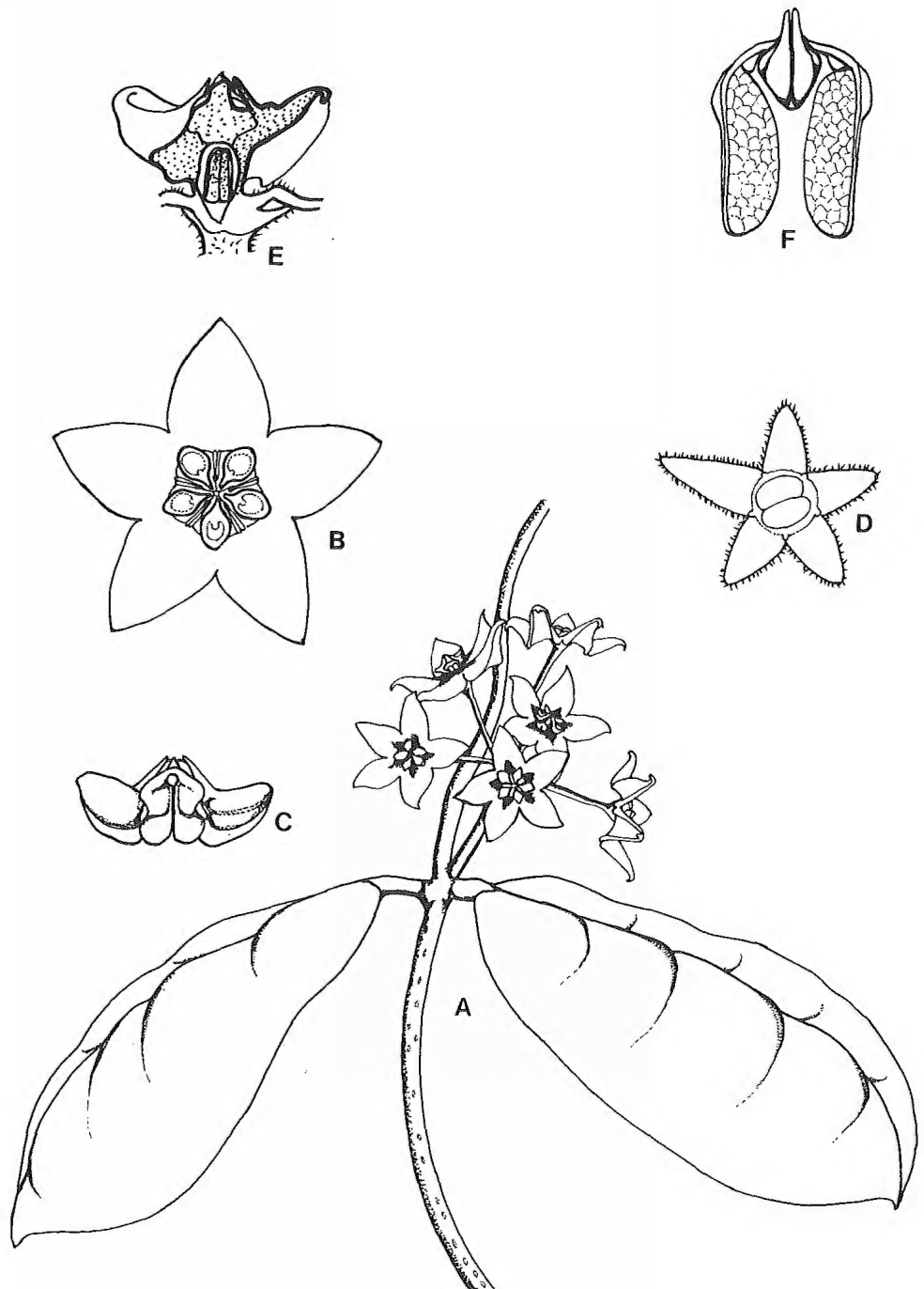


Fig. 3. *Hoya calycina* subsp. *calycina*: A. habit of flowering stem $\times 0.5$. B. face view of flower $\times 12.5$. C. side view of staminal column and corona $\times 3$. D. face view of calyx $\times 3$. E. vertical cross-section of flower $\times 3$. F. pollinarium (inverted) $\times 28$. All from Liddle IML201. Del. D.J. Liddle.

2. Typification and synonymy of *Hoya pottsii* Traill

Hoya pottsii Traill, Trans. Hort. Soc. 7: 25 (1827). **Type:** based on plant in cultivation. (lecto (here designated): Traill, Trans. Hort. Soc. 7: 25. fig 1 (1827)).

Hoya nicholsoniae F. Muell., Fragm. 5: 159 (1866). [October, not specified to day], **synon. nov. Type:** 'In arboribus ad sinum litoreum Rockingham's Bay, *Dallachy*' (holo: MEL *n.v.*).

Hoya hellwigiana Warb. in Fedde, Repert. Spec. Nov. Reg. Veg. 3: 342 (1907). **synon. nov. Type:** 'Kaiser Wilhelms-Land: Bussum bei Finschhafen', *O. Warburg* 21313 (holo: B *n.v.*, destroyed).

Hoya sogerensis S. Moore, J. Bot. 52: 293 (1911). **synon. nov. Type:** Papua New Guinea. CENTRAL PROVINCE: River side Sogere, 1885-6, *H.O. Forbes* 691 (holo: BM!).

Additional selected specimens. Celebes. Sulawesi Selatan, Soroako, S. shore of Lake Matano, *de Vogel* 5793 (BRI). Irian Jaya. Sorong, Roefei River N of the town, Mar 1954, *van Royen* 3007 (L); Mamberamo, Oct 1914, *Feuilletau de Bruyn* 130 (BO,L); Rouffaer River, Aug 1926, *Docters v. Leeuwen* 10122 (BO,L,SING; K *n.v.*); Waigeo Is, Lupintol Village on SW coast of Majalibit Bay, Feb 1955, *van Royen* 5483 (L); Mairipi, near Andai, SW of Manokwari, Nov 1961, *Vink* BW12104 (L). Papua New Guinea. EAST SEPIK PROVINCE: Ramu fluß, *Tappenbeck* 37 (WRSL).

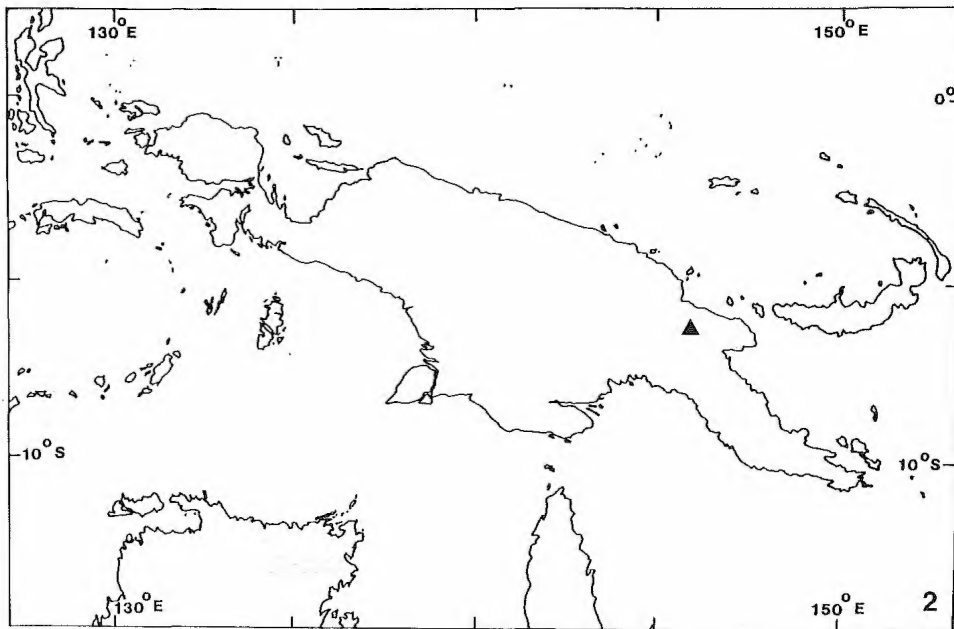
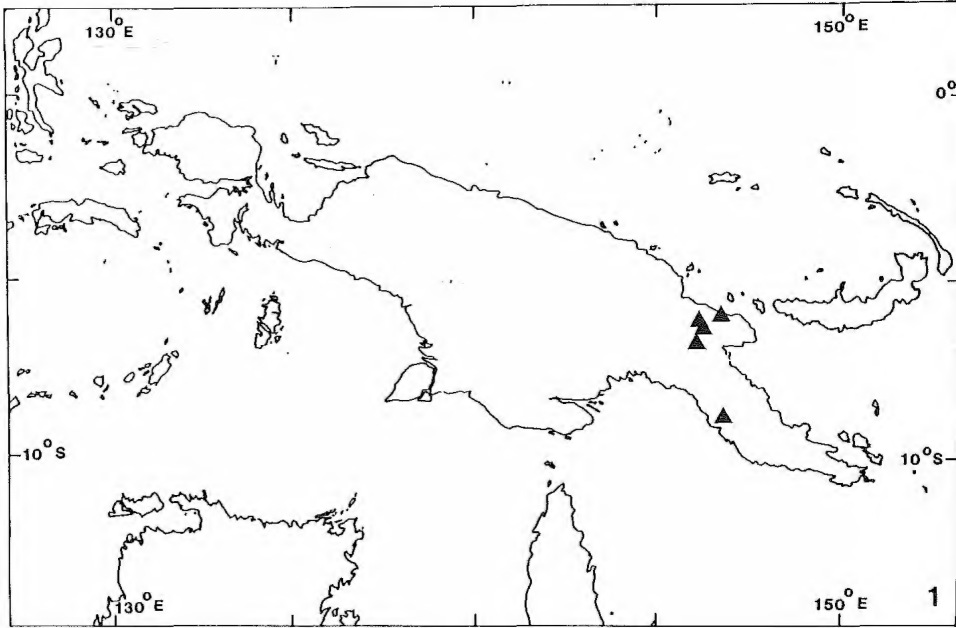
Distribution and habitat: Widely distributed in Celebes, New Guinea and Australia (Forster & Liddle 1990).

Notes: Since the publication of our account of *H. nicholsoniae* F. Muell. (Forster & Liddle 1990), we have been able to examine a much greater range of material, particularly from L, that is referable to this taxon. From this it is clear that *H. nicholsoniae* F. Muell., *H. hellwigiana* Warb. and *H. sogerensis* S. Moore are all conspecific, based on the examination of type collections, original descriptions and collections from the areas where these taxa originated. However, it is evident that *H. pottsii* Traill is also conspecific with these taxa as suggested by Burton (1983) and hence, due to priority, its name is the correct one to be used for the aggregate taxon.

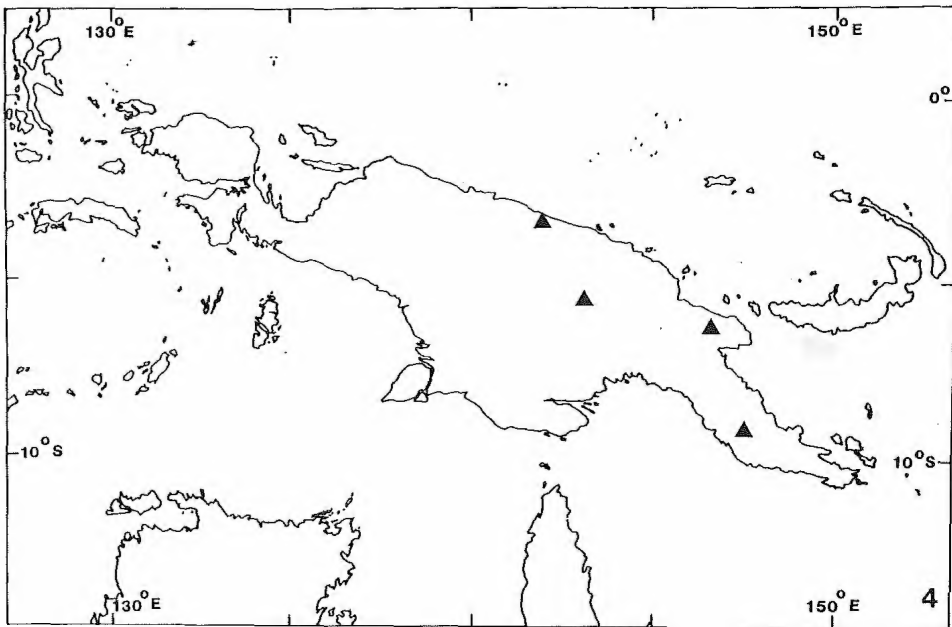
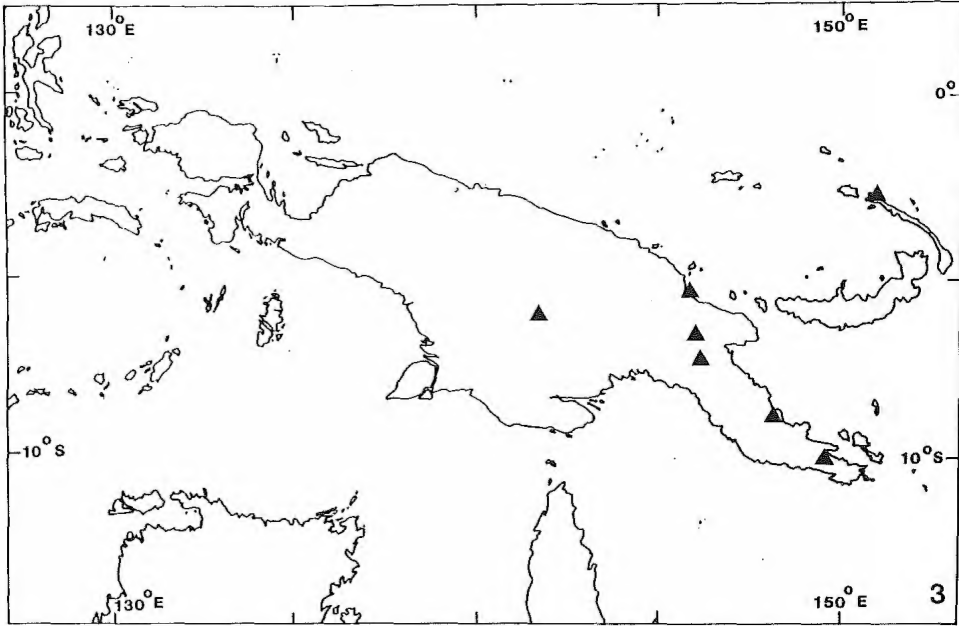
H. pottsii has been newly named in most geographic regions where it has been collected, and although there is wide variation in flower colour and to some extent leaf size and shape, which are both dependent on environment (Forster & Liddle 1990), there are no valid reasons for upholding any of the later names.

The status of *H. samoensis* Seem. described from Samoa, *H. neocaledonica* Schltr. described from New Caledonia, *H. neoebudica* Guill. described from Vanuatu and *H. cominsii* Hemsley, described from Solomon Islands, with respect to *H. pottsii* is unclear at this stage. We have examined a wide range of collections from these areas (holdings at BSIP, P and NOU) and recently collected (June 1991) a range of material from Solomon Islands of *H. cominsii*; however, further comparisons with *H. pottsii* from Australia and New Guinea must wait until this recent material has been grown and flowered under similar conditions.

Typification of *H. pottsii* is critical to the application of the name and this species was named somewhat informally by Traill (1827). There appears to be no specimen at K that could be unequivocally considered as a type for *H. pottsii*. However, there is a flowering specimen at K labelled 'Hoya Pottsii Traill. Hort Glasg. bot. Mag. t. 3425' that may possibly represent the cultivated material illustrated both by Traill and by Hooker (1835). This plant may well have persisted in cultivation at K for a considerable time as there is a further flowering collection of 2 sheets labelled [in part] 'Hoya pottsii Traill native in China . . . EN464-63 Sir George Taylor H2855/86 . . .'. While the geographic origin of both these cultivated collections is problematic, it is unlikely that they came from China [Macao], the reputed origin for *H. pottsii* (Traill 1827; Hooker 1835), and both are conspecific with the Australian and Papuan material. While of dubious status as types of *H. pottsii*, both specimens lend credence to our application of the name *H. pottsii* to the taxa treated as conspecific in this paper. In the absence of an unequivocal type specimen for *H. pottsii*, we have selected as lectotype, the plate published by Traill (1827) which agrees perfectly with the taxon we applied the name to.



Maps 1-2. Distribution of *Hoya* spp. 1. *H. magnifica*. 2. *H. albiflora*.



Maps 3-4. Distribution of *Hoya calycina*. 3. *H. calycina* subsp. *calycina*. 4. *H. calycina* subsp. *glabrifolia*.

No type material of *H. hellwigiana* Warb. has been located; however, we have found the collection *Tappenbeck* 37 that was cited by Schlechter (1913) in his account of this species. Given that Schlechter would have surely seen the type of *H. hellwigiana*, it seems reasonable to allocate this name to synonymy based on this collection and the original description.

3. Typification and synonymy of *Hoya anulata* Schltr.

Hoya anulata Schltr. in Schumann & Lauterb., Nachträge Fl. Schutzgeb. Südsee 362 (1905). **Type:** Papua New Guinea. MADANG PROVINCE: Auf Bäumen am oberen Nuru, auf dem Wege vom Ramu zur Küste, 4 February 1902, *R. Schlechter* 14185 (holo: B!).

Schltr., Bot. Jahrb. Syst. 50: 118 (1913).

Hoya schlechteriana S. Moore, Trans. Linn. Soc. 9: 112 (1916), **synon. nov. Type:** Irian Jaya. Camps III–VI, 1912–13, Utaqua River to Mt Carstensz, *C.B. Kloss* (holo: BM!).

Hoya poolei C. White & Francis, Proc. Roy. Soc. Queensl. 39: 69, fig. 13 (1928), **synon. nov. Type:** Papua New Guinea. MADANG PROVINCE: Joangey, South eastern end of Finnisterre Range, December 1923, *C.E. Lane-Poole* 566 (holo: BRI!; iso: K!).

Hoya pseudolittoralis Norman, Brittonia 2: 328 (1937), **synon. nov. Type:** Papua New Guinea. WESTERN PROVINCE: Dagwa, Oriomo River, Feb–March 1934, *L.J. Brass* 5990 (holo: NY *n.v.*; iso: A!, BM (photo at BRI!), BO!, BRI!).

Hoya alata K. Hill, Telopea 3: 249 (1988), **synon. nov. Type:** Australia, Queensland. COOK DISTRICT: Pascoe River rockpile, *B. Wallace* 83250 (holo: NSW, *n.v.*).

Hoya sp., Jones & Gray, Austral. Climbing Pl. Fig. 126 (1977).

[*Hoya gracilipes* auct. non Schltr.: Jones & Gray, Climbing Pl. Austral. 242 (1988)].

Forster & Liddle, Austrobaileya 3: 228–230 (1990).

Additional specimens examined. Irian Jaya. Orob River, Feb 1913, *Pulle* 1202 (BO,L). Papua New Guinea. WESTERN HIGHLANDS PROVINCE: Baiyer River, Nov 1954, *Womersley & Floyd* NGF6809 (LAE). MOROBE PROVINCE: 4 miles [6.7 km] NE of Boana, near Guambot, 6°30'S, 146°50'E, Mar 1977, *Conn et al.* 70 (CANB,K,LAE); Boana, Jul 1938, *Clemens* 8480 (A,B,L); ditto, May–Nov 1940, *Clemens* 41725 (A,BRI); Bupu Village above Wampit River, Mar 1964, *Millar* NGF23296 (A,BRI,CANB,L,LAE); Ekwap, Wantoat, Aug 1968, *Millar* NGF12130 (L,LAE); Wantoat, Jun 1957, *White* NGF9523 (LAE); Patep, Mar 1959, *Millar* NGF9904 (BRI); Wareo, Jan 1936, *Clemens* 1521 (A); Finnisterre Range, Ekwap, near Wantoat, Aug 1968, *Philipson* 3305 (A,L); Zenag, 7°00'S, 146°35'E, May 1969, *Millar* NGF40862 (LAE). GULF PROVINCE: near Iori Village, Ihu, Apr 1971, *Stone* 10143 (L,LAE). Australia, Queensland. COOK DISTRICT: Garraway Creek rockpiles, Apr 1988, *Forster* 4234 & *Liddle* (BRI); South Pap, Tozers Gap, Jul 1991, *Forster* 9079 (BRI).

Notes: Examination of the type specimen of *H. anulata* Schltr. has found it to be conspecific with *H. pseudolittoralis* Norman (Forster & Liddle 1990). *H. anulata* is widely distributed in New Guinea, but has only been found in the Tozer Range area of Queensland.

Of importance with respect to the synonymy for this taxon, is *H. poolei* C. White & Francis which was applied by Liddle (1986) to the Australian material. Both the BRI holotype and the K isotype of *H. poolei* lack flowers; however, the foliage is a good match for those of *H. anulata* (based on the range of specimens examined) and the flowers figured by White and Francis (1928) agree with those of this taxon.

Isotype specimens of *H. alata* K. Hill have yet to be examined, despite repeated requests to NSW for their distribution.

4. Typification and synonymy of *Hoya revoluta* Wight ex J.D. Hook.

Hoya revoluta Wight ex J.D. Hook., Fl. Brit. India 4: 55 (1883). **Type:** Malaysia. Malacca, 10 November 1867, *A.C. Maingay* 1127 (lecto: K!, *fide* Rintz, Malay. Nat. J. 30: 486 (1978)).

Hoya inconspicua Hemsley, Bull. Misc. Inform. Kew 1894: 213 (1894), **synon. nov. Type:** Solomon Islands, *Officers of H.M.S. Penguin* (holo: K!).

Hoya litoralis Schltr. in Schumann & Lauterb., Nachträge Fl. Schutzgeb. Südsee 363 (1905), **synon. nov.** **Type:** Papua New Guinea. MADANG PROVINCE: Auf Baumen am Strande von Potsdam Hafen, 16 October 1901, *R. Schlechter* 13675 (holo: B (photo at BRI!)).

Forster & Liddle, *Austrobaileya* 3: 228–229 (1990).

Hoya dodecatheiflora Fosb., *Lloydia* 3: 118 (1940), **synon. nov.** **Type:** Solomon Islands. TEMOTU PROVINCE: Santa Cruz Islands, Vanikoro, Tevia Bay, 6 May 1933, *Stewart* (holo: BISH *n.v.*).

Additional selected specimens. **Malaysia.** JOHORE: between G. Blumut & G. Bechua, May 1923, *Holtum* 10844 (K); Bukit Paloh Estate, Apr 1958, *Shah & Kadim* 390 (K,L); Kg. Hubang Development Area, 100 m. s. Endau Road, Jul 1959, *Burkill* 1904 (L). SELANGOR: Sg. Buloh, R.R.I.E.E. Forest Reserve, Nov 1956, *Burkill & Shah* 1066 (K,L). **Indonesia.** **Sumatera.** Vicinity of Aek Mocute (Aer Moette) Asahan, NE of Tomoean Dolok & W of Salabat, Jul 1936, *Boea* 9335 (L); Mt Sago near Pajakumbuh, Jun 1956, *Meijer* 5099 (L). **Borneo.** Central Kutei, Belajan R., near Kembang Djangut, May 1955, *Kostermans* 10692 (L); West Kutei, Mt Palimasan near Tabang on Belajan River, Sep 1956, *Kostermans* 12751 (L). **Irian Jaya.** East bank of Merauke River, S of Senajo, Aug 1954, *van Royen* 4668 (A,CANB,L); Merauke River, West bank between Djedjoerah & Eramboe, Aug 1954, *van Royen* 4812 (CANB,L). **Papua New Guinea.** WEST NEW BRITAIN: Nantambu, Feb 1971, *Lelean & Stevens* LAE51180 (L,LAE). WESTERN PROVINCE: c. 8 miles [13 km] S of Morehead Patrol Post, Trans-Fly area, Aug 1967, *Paijmans* 291 (CANB); Weam, Jul 1967, *Ridsdale* NGF33505 (BO,CANB,L,LAE; K *n.v.*). **Solomon Islands.** GUADALCANAL PROVINCE: Mt Austen area, Jun 1991, *Forster* 8608, 8612 & *Liddle* (BRI); NW of Tinomeat Village, Goldridge area, Jun 1991, *Forster* 8722 & *Liddle* (BRI,K); NW Guadalcanal, Mataniko'o River, Nov 1967, *Nakisi et al.* BSIP8246 (BSIP,K,L). MALAITA PROVINCE: Malaita, Are-are dist., Moka village, Nov 1965, *Hunt* 3080 (K). MAKIRA PROVINCE: San Cristobal, Kira Kira, Aug 1932, *Brass* 2761 (A,L). TEMOTU PROVINCE: Santa Cruz Group, Vanikoro Island, Dec 1928, *Kajewski* (K); Luendambu area, Tomotu Noi, Apr 1972, *Powell* BSIP19500 (BISH,BSIP,CANB,L).

Notes: Like *H. pottsii*, *H. revoluta* has a very wide geographic distribution from Malaysia (Rintz 1978), through Malesia to New Guinea, Solomon Islands and northern Queensland. Once again, this species has been formally renamed in various geographic regions of its occurrence, e.g. *H. inconspicua* Hemsley (Hemsley 1894) and *H. dodecatheiflora* Fosb. (Fosberg 1940) from Solomon Islands and *H. litoralis* Schltr. from New Guinea (Schlechter 1905). The type of *H. inconspicua* is notable for its very long leaves and the type of *H. dodecatheiflora*, as illustrated by Fosberg (1940), for a more raised style-head in relation to the anthers than is typical in *H. revoluta* from Malesia. Examination of many flowering plants in Solomon Islands shows that there are plants with both long and short leaves. Hence this character is unreliable for species distinction. Some plants have raised style-heads whereas others did not. However, there are numerous intermediates and this character is also unreliable for distinguishing species. Hence there is no justification for recognition of these taxa at specific rank distinct from *H. revoluta* s. lat. However, further fieldwork and cultivation under uniform conditions of plants of known origin from throughout the range of *H. revoluta*, may well produce data that justifies an infraspecific taxonomy based on vegetative characters, similar to that proposed for *H. australis* (Forster & Liddle 1991).

H. revoluta appears to be a commonly collected species that occurs in lowland riverine and coastal situations throughout its geographic range.

5. Typification and synonymy of *Hoya sussuela* (Roxb.) Merr.

Hoya sussuela (Roxb.) Merr., *Interpret. Rumph. Herb. Amboinense* 438 (1917); *Asclepias sussuela* Roxb., *Fl. Ind. ed. 2, 2: 31* (1832). **Type:** Rumph., *Herb. Amboinense* 5: t. 172 (1750).

Hoya corona ariadnes Blume, *Rumphia* 4: 31 (1849). **Type:** *Rumphia* 4: t. 182, 185 (lecto: *fide* Merrill, *Interpret. Rumph. Herb. Amboinense* 439 (1917)).

Hoya speciosa Decne. in DC., *Prodr.* 8: 634 (1844). **Type:** Amboina, La Billardiere (holo: ?P *n.v.*, *fide* Merrill, *Interpret. Rumph. Herb. Amboinense* 439 (1917)).

Hoya ariadna Decne. in DC., *Prodr.* 8: 635 (1844). **Type:** Rumph., *Herb. Amb.* 5: t. 172 (1750) (lecto: *fide* Merrill, *Interpret. Rumph. Herb. Amboinense* 439 (1917)).

Hoya coronaria var. *papuana* Bailey, *Queensl. Agric. J.* 3: 156 (1898), **synon. nov.** **Type:** Papua New Guinea: Foot of Mt Trafalgar, *F.M. Bailey* (holo: BRI [AQ360787!]).

Hoya hollrungii Warb., Feddes Repert. Spec. Nov. Regni. Veg. 3: 342 (1907), **synon. nov.** **Type:** Papua New Guinea. WEST SEPIK PROVINCE: Augusta Station, 1887, *M. Hollrung* (holo: B†; iso: MEL 1520112!; K *n.v.*).

Hoya sp., Liddle, *Hoya* in Australia 26, 28–33 (1986); Jones & Gray, Climbing Pl. Austral. 237, 252 (1988).

[*Hoya rubida* auct. non Schltr.: Jones & Gray, Austral. Climbing Pl. 126–127 (1977)].

[*Hoya lauterbachii* auct. non Schumann: P. Forster & Liddle, Austrobaileya 3: 220 (1990)]

Additional specimens examined. Malesia. Amboina, Jul–Nov 1913, *Robinson* 90 (L; K *n.v.*); South Celebes, Danau Towuti, Timampu, Nuha, Luwu, Apr 1984, *Ramlanto* 168 (L; K *n.v.*).

Notes: *H. sussuela* has had a chequered taxonomic history; however, the analysis of Merrill (1917) is relatively unambiguous and his synonymy is followed here. Paramount to the identification of the common taxon that occurs in far northern Queensland and New Guinea now recognised as *H. sussuela*, is the interpretation of plates, 182 and 185 of Blume (1848) and 172 of Rumphius (1750), all of which are based on plants from the Moluccas to the west of Irian Jaya. Table 172 of Rumphius is not particularly helpful, apart from depicting a plant of section *Eriostemma* Schltr. Blume's Table 182, by comparison, is well executed and the plant depicted is conspecific with this taxon common in New Guinea and Australia. Blume's Table 185 depicts only fruit and seed. C.B. Robinson in 1913, attempted to recollect those taxa depicted by Rumphius (Merrill 1917), and his collection No. 90 from Amboina is conspecific both with the plants illustrated in Blume's plates cited and the taxon common in New Guinea and Australia.

The original type citation for *H. hollrungii* requires the collection *Hollrung* 661. The K sheet, which we have not seen, has this number, and although the MEL sheet does not have this number, in all other respects the label data is in agreement with the original citation, and the specimen agrees with the original description. Also we have located the specimen *Schlechter* 14297 (WRSL) which was cited by Schlechter (1905) in his account of *H. hollrungii* and this is conspecific with the taxon delimited here.

In retrospect, we believe that the name *H. lauterbachii* Schumann has been misapplied both to *H. sussuela* in Australia and New Guinea and *H. gigas* Schltr. from New Guinea (Forster & Liddle 1990). The plate of *H. lauterbachii* in Schumann (1905) depicts a plant with more flattened campanulate corollas, long thin pedicels and a sharper angled staminal corona than the plants under consideration here. *H. gigas* has markedly larger flowers (50–70 mm diameter) with more widely spaced coronal lobes. As yet we have not seen either herbarium or live material that quite matches Schumann's plant and its identity remains uncertain.

We still have not found any authentic type material of *H. neoguineensis* Engler, which as mentioned previously (Forster & Liddle 1990), may also be referable here. In the absence of such material this name should still be regarded as of uncertain application. As outlined previously, *H. sussuela* is very variable in flower size and colour (Forster & Liddle 1990), and in the herbaria cited, collections of this taxon account for nearly one third of all the holdings of *Hoya* material.

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B. Leuenberger (B) provided a listing of extant *Hoya* types at B and answered various queries on the existence of specimens. The Directors/Managers of the herbaria A, B, BO, BM, BRI, BSIP, CANB, K, L, LAE, MEL, MICH, NOU, NY, P, US and WRSL allowed access to collections either at their institutions or on loan. The latin diagnoses were translated by L. Pedley. G. Leach (DNA) while Australian Botanical Liaison Officer at Kew, U.K., located and photographed various specimens in K and BM. G. Dennis, Honiara, gave freely of his field knowledge of *Hoya* in Solomon Islands. Some spirited discussions on various aspects of this work were held with *Hoya* devotees Ted Green of Hawaii and Chris Burton of Atlanta, Georgia, U.S.A. An anonymous referee kindly drew our attention to duplicates of various collections held at K. The Australian Biological Resources Study provided funding to P.I. Forster during 1988–1990. We gratefully acknowledge this assistance.

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